

To: New Castle Town Selectmen
From: New Castle Energy Committee
Re: Building (s) Weatherization Program and Recommendations Summary
Date: August 26, 2008

From: Building Weatherization Team - David McArdle - Lead ;
Jim Rini, Ansel Braseth, Wally Mallett, Sandra Bisset, Brad Mead
In appreciation of their assistance: Lynn Seward, Pam Cullen, Brad Mead

The committee reviewed and analyzed the Lamprey Brothers (LB) energy audit.

Town Hall

- I) Lamprey Brothers audit – the town hall has tremendous heat loss through the upper floors and attic space. Having the space insulated as well as sealing off the staircase to the upper floors will help reduce fuel costs greatly.

Committee Recommendations

First Floor: It appears the first floor is adequately addressed in regards to insulation and windows. Primary activity is to **Weather-strip the front door**. Approximate costs to be less than \$ 100.00. The NCEC committee will research historic insulated front doors to see if there are any and will make a recommendation at a later date.

Sealing off the staircase to the upper floors is not recommended, however we do **recommend installing a large paddle fan with a speed control**, which would be relatively inexpensive to install. Upgrade of current system with controller: \$300.00.

Another solution to prevent heat loss within the core area of the building is **to close the large interior double doors in the front hall (just beyond the staircase)**. The doors are heavy and will create a hardship for the elderly; therefore **a handicap door opener would be required**. The cost to install a handicap door opener needs to be determined.

Second Floor: seal off upper floor area at top of staircase with wall.

- II) Lamprey Brothers Audit
Connect an outdoor weather controller to the existing boiler. The cost is \$1,200 with annual fuel savings of 15%.

Committee Recommendations

The committee recommends installing the outdoor weather controller based on the savings outlined below. The Return on Investment (ROI) is 1 to 2.3 years and will save \$500 to \$1,000 a year depending on fuel costs.

Town Hall					Fuel Cost	Fuel Cost
					2007	2008

Average oil consumption (3-year average)	1,429	\$2.40	\$4.60
*Fuel cost per gallon 2007	\$2.40		
* Fuel cost per gallon 2008	\$4.60		
Annual fuel costs based on 3 year aver. fuel consumption		\$3,430	\$6,573
New Equipment			
Option I			
Outside temp controller - 15% fuel savings			
Fuel Savings – gallons		214	
Fuel Savings - dollars			\$514 \$986
Payback analysis			
Equipment cost		\$1,200	
Payback in years			2.3 1.2

- III) Lamprey Brothers audit – Install a high efficiency boiler with an outdoor weather controller at a cost of \$8,600 and an annual fuel savings of 30%.

Committee Recommendations

The committee **does not recommend installing a new boiler** as system is 4 years old, based on the analyses. The (ROI) is 8 to 16 years depending on fuel costs.

Also see alternative energy below.

- IV) Lamprey Brothers audit –
The hot water heater could be replaced at a cost of \$800.

Committee Recommendations

There are two sinks in the town hall, bathroom sink and mop basin, which require minimal hot water. **The system is relatively inexpensive to operate and we can not cost justify replacing the heater at this time. When the hot water heater becomes obsolete, we recommend an on demand electric hot water heater that is installed at the sink or propane on demand system** that would be installed in the basement.

Both systems would eliminate heating water 24-7-365 when there is virtually no demand for hot water by employees or the public.

We recommend a review of the water temperature setting and adjust to 110 degrees. **Insulating the hot water heater** would be cost effective as well.

RECREATION & LIBRARY BUILDING

- V) Lamprey Brothers audit –

The ductwork is not insulated which is a great heat and cooling loss. Insulating these ducts would be at time and material. It's a newly constructed building, which seems to be well insulated.

- VI) The Library has an 80% Rheem furnace, which we would recommend upgrading to a 90+ furnace similar to the one installed for the second floor. The cost of this replacement would be \$4,000 with fuel savings of up to 10%. This furnace could upgrade to a fully modulating Rheem furnace at a cost of \$5,700 with savings of up 15-20%.

NCE Committee Recommendations

Recreation Building

The committee **recommends insulating the ductwork in the recreational building based on the savings outlined below.** The Department of Energy indicates heat loss through uninstalled ducts is 10-30%. However the amount of ductwork involved in this project is small and compact. We estimate a 5% savings overall. Costs to install to be provided by Lamprey Brothers **estimate 2,500**

The ROI is 2.7 to 3.4 years and will save \$700 to \$900 a year depending on fuel costs.

We recommend a review of the **water temperature setting and adjust to 110 degrees. Insulating the hot water heater** would be cost effective as well.

Library

The committee **does not recommend installing a new furnace** based on our analyses (no ROI). The current boiler is relatively new and efficient.

Also see alternative energy below.

Public Works

- VII Lamprey Brothers audit – The public works building needs a lot of work! The heat loss in the existing building would prevent us from doing any kind of energy efficient heating equipment.

Committee recommendation

Any money spent on energy improvements would be a waste. This building is not energy efficient nor structurally sound and at some point it should be razed and replaced with a new structure.

Police Chiefs residence

NC Energy Committee Recommendations

1) Do not recommend installing a new furnace at this time

2) Insulating the hot water heater

When the **hot water heater becomes obsolete we recommend installing a propane, on demand hot water system**. The systems would eliminate heating water 24-7-365, which would reduce fuel costs.

Questions to the Town Selectmen Re: New Castle Energy Committee

1) are we the Town looking to be energy efficient with energy reduction and hence looking to reduce our carbon footprint?

At the end of this report we have included an energy efficient system that will reduce our fuel consumption by 65%. In some cases the costs to install are cost effective and others have a longer Return on Investment (ROI) but reduce our town's carbon footprint.

2) The Jordan Institute has a grant that is for the price of \$50.00 conducting energy audits for the Schools in NH. Can we have your commitment for the expense?

Alternative Energy - Heat Pump

The Acadia Heat Pump (see attached material) can be applied to the Town Hall, Library and the Chief's residences. It can reduce heating cost up to 65% and provides air conditioning as well. The committee plans to research this product during this upcoming heating season and make a recommendation next spring or sooner. The heat pump has been in existence for years but the efficiency was limited to 30-degree air temperature. The product has been redesigned and is efficient up to (-30) degrees air

temperature and no longer requires a secondary source of heat. LB has installed four units this spring with two more on order.

The committee feels this product may be a viable solution to reducing our carbon footprint (approximately 3,700 gallons annually) and energy costs. The following represents an estimated Return on Investment.

Town Hall	Fuel Costs	Fuel Costs
	2007	2008
Oil consumption (3-year average)	1,429	
Fuel costs per gallon	\$2.40	\$4.60
Annual fuel cost based on 3-year average fuel consumption	\$3,430	\$6,573
Replace the current heating system with a Heat Pump. Savings 65% of current fuel costs		
Fuel Saving - Dollars	\$2,229	\$4,273
Reduction in fossil fuel utilization - gallons	1,429	1,429
Payback Analysis		
* Equipment Costs	\$20,000	
Payback in years	9.0	4.7

* Estimate to install the ductwork has not been completed as of this writing.

Library (only)	Fuel Costs	Fuel Costs
	2007	2008
Propane consumption (3-year average)	1,583	
Fuel costs per gallon	\$2.32	\$2.88
Annual fuel cost based on 3-year average fuel consumption	\$3,672	\$4,558
Replace the current heating system with a Heat Pump. Savings 65% of current fuel costs		
Fuel Saving - Dollars	\$2,387	\$2,963
Reduction in fossil fuel utilization - gallons	1,583	1,583
Payback Analysis		
* Equipment Costs	\$30,000	
Payback in years	12.6	10.1
Police Chief's Residence	Fuel Costs	Fuel Costs
	2007	2008
Oil consumption (3-year average)	658	

Fuel costs per gallon	\$2.40	\$4.60
Annual fuel cost based on 3-year average fuel consumption	\$1,579	\$3,027
Replace the current heating system with a Heat Pump. Savings 65% of current fuel costs		
Fuel Saving - Dollars	\$1,026	\$1,967
Reduction in fossil fuel utilization - gallons	658	658
Payback Analysis		
* Equipment Costs	\$15,000	
Payback in years	14.6	7.6

The New Castle Energy Committee will start Phase II of the Buildings) Weatherization program as outlined below:

Determine the cost to install a handicap door opener for the town hall inside hall doors.

Determine cost to install upgraded fan and controller (2nd floor)

Research historic insulated front doors for the town hall.

Determine the viability of Geothermal or heat pump for the recreational/library building.

Perform an energy audit regarding the school, review Jordan Institute audit

Review lighting systems and electrical consumption within the municipal buildings.

Further study required for the public works building.

Review heat settings and fan utilization procedures at the recreational buildings.

Evaluate renewable energy options for all buildings in a long range plan.

Municipal Fuel Consumption Per Building

Propane		Calendar year	2007	2006	2005	3-yr aver.
Energy USA	800-822-1300 extension 5 ask for Judy					
account # 069688S						
Tank 1	Commons & Library	Gallons used	7,348	6,690	9,701	7,913
Tank 2	Fire Department	Gallons used	1,408	1,283	1,955	1,549

Tank 3	Maintenance Shop	Gallons used	807	699	821	776
Tank 4	Skating Rink Shed	Gallons used	67	64	58	63

In 2007 the price of fuel ranged from \$2.02 to 2.61. Average = \$2.32

As of 8-18-08 the spot price is \$2.88 per gallon. The town does not have a contract.

Oil

Lamprey Brothers 964-4070 Kevin Anderson

Account 121195 Police Chief's residence and 121187 Town Hall

	Calendar year	2007	2006	2005	3-yr aver.
Town Hall		1,522	1,268	1,498	1,429
Police Chief's residence		625	596	757	659
Oil assistance program		534	257	424	405

2007 oil price was set at \$2.40. 2008 oil price has not been established as of this writing.

Date: 07/29/08

Lamprey Brothers logo here

Town of New Castle
Main Street
New Castle, NH 03854

Dear Sandra,

I have toured New Castle's town buildings along with Joanne Lamprey and Veissmann rep Tom Fullerton. The following is my recommendations for each building we looked at.

The most important aspect for any energy savings is insulation and controlling heat loss. The Town hall has a tremendous heat loss thru the upper floors and attic space. Having the space insulated as well as sealing off the stair case to the upper floors will help reduce your fuel costs greatly. Using the existing boiler, you could add an outdoor weather responsive reset control which should save you up to 15% on fuel usage. The cost of this control is \$1200.00. The next option would be a higher efficiency boiler, Veissmann Vitola Biferral boiler with outdoor control for a cost of \$ 8,600. This would result in a fuel savings of 30%. Current oil usage on this building is 1300 gallons per year. Outdoor reset control would pay back in about 1.5 years. New boiler would pay back in about 6 year's time. Also noted was a lack for inspection on the fire extinguisher and a very tired electric water heater. The water heater could be replaced at a cost of \$800.00. The chimney for this building really needs to be looked at by a qualified chimney sweep. The Hallowell heat pump would take the town hall completely off oil, with operating cost savings of 64%. This equates to a 6 year payback, or a 20 year return on investment of \$ 46,000! This would also add central cooling to 1st floor of building, and eliminate the need for necessary chimney work. Ductwork will need to be added, will need to revisit for exact price but \$20,000 is fairly accurate. Heating and cooling designed for 1st floor of building only.

- | | |
|---------------------------------------|-----------------------------------|
| ➤ Tekmar outdoor reset | \$ 1,200.00 15% fuel savings |
| ➤ Veissmann boiler with outdoor reset | \$ 8,600.00 30% fuel savings |
| ➤ Hallowell heat pump | \$ 20,000.00 64% savings over oil |

The next building we looked at was the fire station. We would really need to have complete plans for the future renovations to suggest any energy savings project. It is highly recommend to include spray foam insulation with any future projects for the building. Hi efficiency heating equipment as well as low temp radiant would help conserve energy costs. No real prices can be given without plans. Low temp radiant would allow to be heated with Geothermal.

We looked at the Recreation building next. The ductwork is un-insulated which is a great heat and cooling loss. Insulating these ducts would be at time a material. It's a newly constructed building which seems to be well insulated. No real recommendations here.

The system here could be replaced with a Hallowell Acadia heat pump to remove from fossil fuels. I will return to re-measure to give an accurate quote on this option.

The Library has an 80% Rheem furnace which I would recommend upgraded to a 90+ furnace similar to the one installed for the 2nd floor. The cost of this replacement would be \$4,000 with a fuel savings of 10%. This furnace could be upgrade to a fully modulating Rheem furnace at a cost of \$ 5,700 with a savings of 15-20%. Each of these systems could be replaced with a Hallowell Acadia Heat pump, which would result in 64% savings in fuel

- 90+ condensing furnace \$ 4,000 fuel savings of 10%
- Rheem fully modulating furnace \$ 5,700 fuel savings of 15-20%
- Acadia heat pump replacement \$ 15,000 per system, fuel savings of 64%

The last two buildings surveyed were the public works and Police Chiefs residence. The public works building needs a lot of work! The heat loss in the existing building would prevent us from doing any kind of energy efficient heating equipment. The furnace in the chief's residence of over sized and outdated. We would recommend replacing this furnace with an energy efficient Thermopride direct vent oil furnace at a cost of \$6,000. This would also eliminate the use of the chimney. Also, could replace with the Hallowell Acadia Heat pump and remove completely from fossil fuels, save 64% in operating costs, and add central cooling to come.

- Thermopride direct vent furnace \$ 6,000 fuel savings of 5-10%
- Acadia heat pump \$ 15,000 fuel savings of 64%

For all the buildings, a set back thermostat per zone would conserve energy. The cost of the thermostats installed is \$150.00 each. After you have had a chance to look over this information, please feel free to contact me with any questions or concerns at 800-333-6703 or via e-mail at kevina@lampreybrothers.com. I look forward to hearing from you.

Sincerely,

Kevin Anderson
Lamprey Brothers, Inc.